Ionization cross-section measurements of metallic atoms*

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There is an important need for the ionization cross-sections of metallic atoms in high temperature plasma devices, astrophysical plasmas and plasma processing. Experimental determination of ionization cross sections for metal atoms is not an easy task due to several difficulties. First, most metal atoms require high temperatures to form their vapors. Second, in order to obtain cross sections values, absolute number densities in vapor phase are needed. Therefore, these cross sections have been measured only by very few experimental groups and for a limited number of elements. A pulsed crossed beam technique that can measure ionization cross-sections of metallic atoms is presented. Relative values of cross-sections of single, double and triple ionization of magnesium have been successfully measured with good accuracy over the 0-700 eV range. Absolute values of cross-sections have been obtained by normalization to a theoretical value at high electron energy. Results are compared to previously published values and, for single ionization in particular, a comparison with theoretical cross-sections has been made.

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